

Application No.: 10/810,435

Docket No.: JCLA11487-R

REMARKSPresent Status of the Application

The Office Action rejected claims 1-2, 4, 6-8, 10, 12-14, 18 under 35 U.S.C. 102(e), as being anticipated by Heima (US 6,894,598). The Office Action rejected claims 3, 5, 9, 11, 15-17, 19-23 under 35 U.S.C. 103(a) as being unpatentable over Heima in view of Furumiya (US 2003/0146816).

Applicants have amended claims 1, 7 and 13 to more clearly define the present invention. The amendments in claims 1, 7 and 13 are as shown in Figs. 2A-2C, Figs. 3A-3C and Figs. 4A-4C. The term of circular-spiral trench added in claims 1 and 13 are supported by the drawings and the specification because the second inductor pattern having circular-spiral shape is formed after filling a metal layer in the circular-spiral trench, that is the trench has the same shape with the second inductor pattern. Therefore, applicant respectfully submits the amendments of claims 1, 7 and 13 meet the written description requirement of 35 U.S.C. 112, first paragraph.

After entry of the foregoing amendments, claims 1-23 remain pending in the present application, and reconsideration of those claims is respectfully requested.

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**Rejection under 35 U.S.C 102 (e)**

*Applicants respectfully traverse the 102(e) rejection of claims 1-2, 4, 6-8, 10, 12-14, 18 because Heima (US 6,894,598) does not teach every element recited in these claims.*

In order to properly anticipate Applicants' claimed invention under 35 U.S.C 102, each and every element of claim in issue must be found, "either expressly or inherently described, in a single prior art reference". "The identical invention must be shown in as complete details as is contained in the .... claim. Richardson v. Suzuki Motor Co., 868 F. 2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989)." See M.P.E.P. 2131, 8<sup>th</sup> ed., 2001.

The present invention is related to a method of fabricating an inductor as claim 1 recites:

1. (currently amended) A method of fabricating an inductor formed on a substrate having at least one first dielectric layer thereon, the method comprising:

forming a patterned first metal layer and a first inductor pattern within the first dielectric layer;

forming a patterned second dielectric layer on the first dielectric layer for covering the first metal layer, the first inductor pattern and the first dielectric layer, *the second dielectric layer having an opening and a circular-spiral trench*, wherein the opening exposes the first metal layer and the circular-spiral trench exposes the first inductor pattern;

*filling a metal within the opening and the circular-spiral trench for forming a second metal layer within the opening and a second inductor pattern within the circular-spiral trench*, wherein the second metal layer directly contacts with the first metal layer and *the second inductor pattern directly contacts with the first inductor pattern*; and

forming a patterned third metal layer on the second metal layer and a third inductor pattern on the second inductor pattern, wherein the third metal layer directly contacts with the second metal layer, *the third inductor pattern directly contacts with the second inductor pattern*, and the first inductor pattern and the third inductor pattern are not completely overlapping.

In the Heima reference, as shown in Figs. 3A, 3B and 3C, the winding part 8 is electrically connected to the winding part 46 *through the via hole 54*, and the winding part 46 is electrically connected to the winding part 11 *through the via hole 55*. Similarly, the winding part 7 is electrically connected to the winding part 45 *through the via hole 52*, and the winding part 45 is

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electrically connected to the winding part 11 *through the via hole 53* (see col. 9, lines 10-58). However, in claim 1 of the present application, the second inductor pattern *directly contacts* with the first inductor pattern and the third inductor pattern *directly contacts* with the second inductor pattern without using via holes. Because the first and third inductor patterns are electrically connected to each other through the whole second inductor pattern having large area, the thickness of the inductor is increased from the three-layer inductor structure, and the resistance of the inductor, therefore, is reduced.

Moreover, in the Heima reference the winding part 46 is covered by the dielectric layer 43, and therefore the winding part 46 is not formed by filling a metal layer into a trench formed in a dielectric layer, but is formed by forming a metal layer over the dielectric layer 43 and then patterning or etching the metal layer for forming the winding part 43. However, in claim 1 of the present invention, the second inductor pattern is formed by filling a metal layer within the circular-spiral trench. Heima does not teach the winding part 46 is formed by the method as claim 1 recites.

Therefore, Heima does not teach every element recited in claim 1. Applicants respectfully submit that independent claim 1 patently defines over the prior art reference, and should be allowed. For at least the same reasons, dependent claims 2, 4 and 6 patently define over the prior art as a matter of law.

The present invention also provides an inductor as claim 7 recites:

Claim 7. An inductor formed on a substrate having at least one dielectric layer thereon, comprising:  
a first inductor pattern formed within the dielectric layer;  
*a second inductor pattern formed on the first inductor pattern and directly contacting therewith;* and

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*a third inductor pattern formed on the second inductor pattern and directly contacting therewith*, wherein the first inductor pattern and the third inductor pattern are not completely overlapping.

In claim 7 of the present application, the second inductor pattern *directly contacts* with the first inductor pattern and the third inductor pattern *directly contacts* with the second inductor pattern without using via holes. However, as discussed above, Heima teaches the winding part 8 is electrically connected to the winding part 46 through the via hole 54, and the winding part 46 is electrically connected to the winding part 11 through the via hole 55. Heima fails to teach or suggest the first the second inductor pattern *directly contacts* with the first inductor pattern and the third inductor pattern *directly contacts* with the second inductor pattern without using via holes. Therefore, Heima does not teach every element recited in claim 7. Applicants respectfully submit that independent claim 7 patently defines over the prior art reference, and should be allowed. For at least the same reasons, dependent claims 8, 10 and 12 patently define over the prior art as a matter of law.

Furthermore, the present invention also provides a method of fabricating an inductor as claim 13 recites:

Claim 13. A method of fabricating an inductor formed on a substrate having at least one first dielectric layer thereon, comprising:

forming a patterned first metal layer and a first inductor pattern within the first dielectric layer;

forming a patterned second dielectric layer on the first dielectric layer for covering the first metal layer, the first inductor pattern and the first dielectric layer, *the second dielectric layer having an opening and a circular-spiral trench*, wherein the opening exposes the first metal layer and the circular-spiral trench exposes the first inductor pattern; and

forming a second metal layer filling the opening and on the second dielectric layer and *forming a second inductor pattern filling the circular-spiral trench* and on the second dielectric layer, wherein the second metal layer directly contacts with the first metal layer and *the second inductor pattern directly contacts with the first inductor pattern*, and the first inductor pattern and the second inductor are not completely overlapping.

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In claim 13 of the present application, the second inductor pattern *directly contacts* with the first inductor pattern without using via holes. In addition, the second inductor pattern is formed by filling a metal layer within the circular-spiral trench. However, as discussed above, Heima fails to teach or suggest the second inductor pattern *directly contacts* with the first inductor pattern using via holes and Heima also fails to teach or suggest the second inductor pattern is formed by filling a metal layer within the circular-spiral trench. Therefore, Heima does not teach every element recited in claim 13. Applicants respectfully submit that independent claim 13 patently defines over the prior art reference, and should be allowed. For at least the same reasons, dependent claims 14 and 18 patently define over the prior art as a matter of law.

**Rejection under 35 U.S.C 103 (a)**

*Applicants respectfully traverse the rejection of claims 3, 5, 9, 11, 15-17, 19-23 under 103(a) as being unpatentable over Heima in view of Furumiya (US 2003/0146816) because a prima facie case of obviousness has not been established by the Office Action.*

To establish a prima facie case of obviousness under 35 U.S.C. 103(a), each of three requirements must be met. First, the reference or references, taken alone or combined, must teach or suggest each and every element in the claims. Second, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skilled in the art, to combine the references in a manner resulting in the claimed invention. Third, a reasonable expectation of success must exist. Moreover, each of the three requirements must "be found in the prior art, and not be based on applicant's disclosure." See M.P.E.P. 2143, 8<sup>th</sup> ed., February 2003.

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Applicants submit that, as disclosed above, Heima fails to teach or suggest each and every element of claims 1, 7 and 13 from which claims 3, 5, 9, 11, 15-17, 19-23 depend. In the Furumiya reference, Fig. 5 shows a semiconductor device having two layered structure comprising conductive layers 1a, 1b and conductive layers 2a, 2b, and the conductive layers 1a, 1b and the conductive layers 2a, 2b are completely overlapping. The semiconductor device of Fig. 5 does not composed of three inductor patterns as claims 1 and 7 recites. Fig. 5 also fails to disclose the first inductor pattern and the third inductor pattern are not completely overlapping as claims 1 and 7 recite. In addition, Fig. 10 of the Furumiya reference also discloses a structure comprising conductive layers 3a, 3b, conductive layers 4a, 4b and conductive layers 5a, 5b. However, the conductive layers 3a, 3b are not formed on the conductive layers 4a, 4b. The conductive layers 3a, 3b and the conductive layers 4a, 4b are formed at the same level. Only at the connection part of conductive layers 5a, 5b, a small portion of the conductive layer 3a raises. Therefore, Fig. 10 also fails to disclose the first, second and third inductor patterns as claims 1 and 7 recite.

Moreover, in Figs. 5-7 of the Furumiya reference, the conductive layers 1a, 1b are not directly contacts with the conductive layers 2a, 2b. In other words, the conductive layers 1a, 1b are electrically connected to the conductive layers 2a, 2b *via the contact 13* (see Fig. 7 and paragraph [0037]). Therefore, Figs. 5-7 of the Furumiya reference does not teach the second inductor pattern *directly contacts* with the first inductor pattern without using via holes and the second inductor pattern is formed by filling a metal layer within the circular-spiral trench as claim 13 recites. In addition, Fig. 10 of the Furumiya reference does not teach the second

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inductor pattern is formed by filling a metal layer within a circular-spiral trench as claim 13 recites.

For at least the reasons, Furumiya cannot cure the deficiencies of Heima, and thus the two references (Heima and Furumiya) combined do not teach each and every element of claims 1, 7, 13. Applicants respectfully submit that independent claims 1, 7, 13 patentably defines over the prior art references, and should be allowed. For at least the same reasons, dependent claims 3, 5, 9, 11, 15-17, 19-23 patentably define over the prior art as a matter of law.

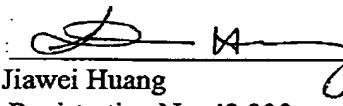
### CONCLUSION

For at least the foregoing reasons, it is believed that the pending claims are in proper condition for allowance. If the Examiner believes that a telephone conference would expedite the examination of the above-identified patent application, the Examiner is invited to call the undersigned.

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